Attorney's Docket No.:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.: 10/566,433   Confirmation No.: 5657

In re Application of:

      Daisuke MUKAI, et al.   Group Art Unit: 1793

Filed: January 31, 2006   Examiner: Roe Jessee Randall

For: LOW CO HYDROGEN STORAGE ALLOY

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DECLARATION UNDER 37 C.F.R. § 1.132

I, <u>Shinya KAGEI</u>, declare that:

1.   I received a Bachelor of Engineering degree in applied science, from Osaka City University, Osaka, Japan in 1994. I have been employed for 15 years as a head of development section of Mitsui Mining & Smelting Co., Ltd.

2.   I am a co-inventor of the subject-matter described and claimed in the above-captioned application.

3.   I have read the Office Action mailed January 13, 2009. This Declaration is provided in response to the rejection under 35 U.S.C. § 103(a) as being obvious over Kaneko et al. (US 6,261,517).

4.   This experiment was carried out under Shinya KAGEI's direction.

5.   Purpose of the Experiment

     Relationship between the present invention and Kaneko et al. (US 6,261,517)

was reviewed by conducting the production method disclosed in Kaneko et al. (US 6,261,517) in order to obtain hydrogen storage alloy thereby and measure a-axis length, c-axis length and pulverization residual rate of the obtained hydrogen storage alloy by using measuring method specified in the present invention.

6.   Experimental Data

Metals of Mm (misch metal), Ni, Mn, Co, and Al were measured out so that the composition of the starting material was MmNi4.3Co0.2Mn0.7Al0.5(AB5.7), and melted in a high frequency induction furnace under argon atmosphere to thereby prepare an alloy melt. The alloy melt was held at 1450° C., and then rapidly cooled on a water-cooled copper roll at a cooling rate of 1000 to 3000° C./sec to prepare 0.1 to 0.3 mm thick alloy flakes. The alloy flakes thus obtained were heated at 900° C. for 5 hours under argon atmosphere to precipitate the Mn-rich phase, and thus a hydrogen storage alloy was obtained.

<a-axis Length> <c-axis Length>

A hydrogen storage alloy (ingot) was ground and screened to classify the particles into -20 µm (particle sizes that passed through a screen of a diameter of 20 µm), 20 µm to 53 µm (particle sizes that did not pass through a screen of a diameter of 20 µm, but passed through a screen of a diameter of 53 µm), and 53 µm or more (particle sizes that did not pass through a screen of a diameter of 53 µm), of which the powder of -20 µm was filled in a glass holder to serve to a powder X-ray diffractometer (XRD manufactured by RIGAKU). Measurement was carried out using CuK α-line at a scanning speed of 1°/min and an angle of 100° to 150°, the lattice constant was refined using an error function measuring method (Wilson & Pike method), and the a-axis length (pm) and c-axis length (pm) were calculated. The values of the calculated a-axis length and c-axis length have variations of ±0.1 pm.

The result was as follows:

Sample	a-axis length (pm)	c-axis length (pm)
Test alloy 090302	498.5	406.8

<Pulverization Residual Rate (50-D/%)>

Hydrogen storage alloy powder was produced by grinding a hydrogen storage

alloy (ingot), screening to select particles in the particle size range between 20 μm and 53 μm. The average particle size (D$_{50}$) of the hydrogen storage alloy powder was measured using a particle size distribution measuring device (Microtrac, manufactured by NIKKISO Co., Ltd.), and this was used as pre-cycling particle size. Next, 2 g of the hydrogen storage alloy powder was weighed and the sample was placed in a PCT holder, and after the surface of the MH alloy was cleaned twice under hydrogen pressure of 1.75 MPa, and activated twice by introducing hydrogen of a pressure of 3 MPa.

After activation treatment, a cycle test was repeated 50 times (temperature condition: 45° C.) such that hydrogen gas of a pressure of 3 MPa was introduced and absorbed on 2.0 g of the hydrogen storage alloy powder using a PCT device (automatic Sievert's system, manufactured by Suzukishokan Co. Ltd.), and hydrogen was then desorbed at 45° C.

Thereafter, the hydrogen storage alloy powder was recovered, the average particle size (D$_{50}$) was measured again, and this was used as post-cycling particle size. Both the average particle sizes (D$_{50}$) were used to calculate the pulverization residual rate (%) after 50 cycles using the following equation:

Pulverization residual rate (%)=(Post-cycling particle size/pre-cycling particle size)×100

Sample	Pre-cycling particle size (μm)	Post-cycling particle size (μm)	Pulverization residual rate (%)
Test alloy 090302	46.33	21.75	47

8.   Conclusion

The results show that the pulverization residual rate (%) of the Kaneko et al. (US 6,261,517) is outside the claimed range of the present invention.

9.   In view of these results, neither a person of ordinary skill in the art, nor me personally, would have found that the claimed a-axis length and pulverization residual rate are anticipated or obvious over Kaneko et al. (US 6,261,517).

10.   I declare under penalty of perjury under the laws of the United States that all statements made herein based on my own knowledge are true, and all statements

3

made on information and belief are believed to be true. I acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both and may jeopardize the validity of the application of any patent issuing thereon.

Date: _June 22, 2009_   Signature: _Shinya Kagei_
Shinya KAGEI

4